

CLAIMS

1. A system for providing service in a wireless local area network comprising

5 i. a single or plurality of wireless access points (WAP) capable of processing a subset of complete functionality defined for the wireless local area network;

10 ii. a single or plurality of control nodes (CN) capable of providing a subset or complete functionalities defined for the wireless local area network; and

15 iii. negotiation means for the wireless access points to dynamically negotiate with the control node for a secure connections and function split arrangement;

whereby, in use, the control node would negotiate with the WAPs using the negotiation means and provide same or different complementary functionality for each of the WAPs to form a complete functionality defined for
20 the wireless local area network according to decision of the negotiation means.

2. The system according to claim 1 wherein said wireless access point and control nodes further comprise
25 logically independent functional components of the

functionalities defined for the wireless local area network with predefined interface used between each functional components.

5 3. The system according to claim 2 wherein interfaces between said functional components could be used over remote connections between said wireless access point and control node.

10 4. The system according to claim 1 wherein each said control node further comprises a control node controller module and each said wireless access point further comprises a wireless access point controller module.

15 5. The system according to claim 4 wherein the controller module of control node further comprises a single or plurality of processing schedules composed of sequential lists of descriptors for subsets of functional components used for each wireless access
20 point.

6. The system according to claim 4 wherein the controller module of wireless access point further comprises a single or plurality of processing schedules
25 composed of sequential lists of descriptors for subsets

of functional components used for each associated mobile terminal.

7. The system according to claim 1, wherein the
5 wireless access point further comprises:

i. means for discovering the available control node within a specified domain; and

ii. means for negotiating secure connection with control node that could offer the desired functions;

10 whereby, in use, the wireless access point is able to locate the control node that provides necessary complementary functionalities with regard to a set of defined complete wireless local area network functions with the means for discovering and establishing secure
15 connection with the control node with the means for negotiating.

8. The system according to claim 1, wherein the controller module of said control node is capable of
20 generating data unit to resemble that from a mobile terminal.

9. A system for load balancing in a wireless local area network (WLAN) without requiring association
25 handover at a mobile terminal comprising:

i. a single or plurality of mobile terminals, each said mobile terminal associated with and receiving services from a single or plurality of wireless access point (WAP);

5 ii. a single or plurality of wireless access point that are capable of processing data units received from the mobile terminal or other wireless access point using a subset of defined WLAN functions; and

10 iii. means for the wireless access points to exchange data units processed with a subset or complete defined WLAN functions;

whereby a data unit for a mobile terminal is processed with complete WLAN functions by a single or plurality of WAPs where each WAP processes the data unit
15 with only a subset of complete WLAN functions.

10. The system according to claim 9 wherein the wireless access point further comprises a control module that is capable of negotiating with other wireless
20 access points for a subset of the complete WLAN functions to be carried out at each wireless access point.

11. The system according to claim 9 wherein the
25 wireless access point further comprising a local

database that stores all the associations of the mobile terminals attached to said wireless access point and corresponding subset of the complete WLAN functions to be provided to the mobile terminal.

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12. The system according to claim 1, wherein the functionalities of said WAP and CN collocate in a single network element.

10 13. A method for providing service in a wireless local area network (WLAN) that allows defined WLAN function split between wireless access point (WAP) and a single or plurality of Control Node (CN) comprising the steps in which:

15 i. a WAP discovers the CN that may provide complementary WLAN functions by sending a single or plurality of messages containing information about its own subset of WLAN functions to all the CN;

ii. a CN after receiving said discover message
20 replies with a single or plurality of messages containing information about a subset of WLAN functions said CN could offer to the WAP; and

iii. said WAP chooses from all the replied CNs a proper CN based on local policy and establishes
25 association with said chosen CN.

14. The method for the WAP to decide which CN to use according to claim 13 using information, the information comprising:

- 5 i. the subset of the WLAN functions offered by the CN;
- ii. a cost of using the CN;
- iii. a vendor of the CN;
- iv. a characteristics of the connection to the
- 10 CN; and
- v. a weighted sum of the above factors.

15. A method for providing service in a wireless local area network (WLAN) that allows defined WLAN function split between wireless access point (WAP) and a single or plurality of Control Node (CN) comprising the steps in which:

- i. a CN dynamically discovers the capability of a WAP by sending a single or plurality of messages to a
- 20 WAP containing a section that emulates a data unit sent by a mobile terminal;
- ii. a WAP receives said message, processes said section using the same procedure for processing data units received from a mobile terminal and sends data
- 25 unit back to said CN in a reply message; and

iii. said CN obtains the capability information of said WAP by examining the processed data units in said reply message.

5 16. A method for providing service in a wireless local area network (WLAN) that allows defined WLAN function split between a wireless access point (WAP) and a single or plurality of Control Node (CN) comprising the steps in which:

- 10 i. a CN obtaining capability of the WAP; and
ii. said CN negotiating with another one or a plurality of CNs for the supplementary WLAN functions to be provided to the WAP.

15 17. A method for carrying out load balancing in a wireless local area network (WLAN) without requiring a mobile terminal to change association relationship with a wireless access point (WAP) comprising the steps in which:

- 20 i. the WAP separates the processing function provided to the mobile terminal into an association specific part and a non-association specific part;
ii. said WAP negotiates with another WAP of the non-association specific part and establishes a secure
25 tunnel with said another WAP;

iii. said WAP tunnels the data unit from a mobile terminal to the said another WAP through the tunnel after processing data unit with the association specific part of functions; and

5 iv. said another WAP receiving the processed data unit through said tunnel and processing it with non-association specific part of functions.

18. The method according to claim 17 further
10 comprising the step in which said WAP uses a wireless channel to establish direct connection with another WAP and sets up secure tunnel over the direct connection.

19. The method according claim 17 further comprising
15 the step in which the WAP decides on whether to tunnel data unit from the mobile terminal to another WAP for non association specific processing by monitoring the load at WAP and comparing it with a preset threshold value.

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20. The method according to claim 17 further comprising the step in which said WAP decides on which other WAPs should be used for non association specific processing by monitoring the loads at different WAPs it
25 has connections with and compares them with a preset

threshold value.

21. The method according to claim 17 further comprising the step in which a central control entity
5 monitors the load status on all WAPs within a certain domain and mandates distribution of non-association processing function between different WAPs.

22. The method according to claim 17 for the WAP to
10 determine the distribution of non-association specific function based on information, the information comprising:

- i. a size of the data unit to be processed;
- ii. an expected average time for the processing
15 of the data unit;
- iii. an overhead time for processing the data unit; and
- iv. a weighted sum of above factors.

20 23. A method for providing service in a wireless local area network (WLAN) that allows defined WLAN function split between wireless access point (WAP) and a single or plurality of Control Node (CN) comprising the steps in which:

- 25 i. a subset of WAPs processes the total of its

subset of functionality defined for the WLAN; and

ii. a CN provides distinct subsets of complementary functionality defined for the WLAN to each of the subset of WAPs.

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24. A method for providing service in a wireless local area network (WLAN) that allows defined WLAN function split between wireless access point (WAP) and a single or plurality of Control Node (CN) comprising the steps

10 in which:

i. a CN determines a common subset of functionality required for the WLAN available at a subset of the WAPs;

15 ii. each WAP of the subset processes the said determined common subset of functionality; and

iii. a CN provides similar subsets of complementary functionality to each of the subset of WAPs.

20 25. A method for accommodating variances in a wireless network topology comprising the step of dynamically adapting the operations logic of at least one network entity of said wireless network topology to alter processing of one or more functional sub-components.

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26. The method according to claim 25 further comprising the step of altering the processing of selected functional sub-components at the at least one network entity by means of bypassing processing of said
5 selected functional sub-components.

27. The method according to claim 25 further comprising the step of altering the processing of a selected functional sub-components at the at one or more
10 network entity by means of selectively processing said selected functional sub-components.

28. A method for compensating variances in latency in a wireless network comprising the steps of;
15 bypassing processing of selected functional sub-components at a first network entity and;
performing processing of said bypassed functional sub-components at a second network entity.

20 29. A method for altering local-level functional semantics while maintaining system-wide functional semantics of a wireless network comprising the step of selectively activating functional sub-components of selected network entities such that the sum of activated
25 functional sub-components across said wireless network

corresponds to complete functional sub-components of said wireless network.

30. The method according to claim 29 further
5 comprising the step of shifting the processing of said activated functional sub-components from a first network entity to a second network entity.

31. A method for determining topology of a wireless
10 network, wherein a first network entity alters connectivity association with a second network entity by including one or more third network entities in the communication path of the alternate connectivity association, comprising the steps of;

15 exchanging information on neighbouring network entities among said network entities of said wireless network;

 analyzing communication frames received by said network entities based on pre-established
20 representations of topology of said wireless network;

 analyzing association request frames received by said network entities based on pre-established representations of topology of said network.